

Claims

1. A porous material wherein silicon carbide particles as an aggregate are bonded with one another via silicon nitride as a binder in such a state that pores are present between the silicon carbide particles, wherein
  - 5 no columnar silicon nitride (silicon nitride whisker) is formed on the surface of the silicon nitride within each pore, or that,
    - even when columnar silicon nitride is inevitably formed there, the number of the columnar silicon nitride having a thickness of more than 2  $\mu\text{m}$  and an aspect ratio of less than 10 is greater than that of the columnar silicon nitride having a thickness of 2  $\mu\text{m}$  or less or an aspect ratio of 10 or more.
- 15 2. A porous material wherein silicon carbide particles as an aggregate are bonded with one another via silicon nitride as a binder in such a state that pores are present between the silicon carbide particles, wherein the pores have a specific surface area of 1  $\text{m}^2/\text{g}$  or less.
- 20 3. A porous material according to Claim 1 or 2, wherein an open porosity is 40 to 75%.
4. A porous material according to any of Claims 1 to 3, wherein the pores have an average pore diameter of 5 to 50  $\mu\text{m}$ .
- 25 5. A porous material according to any of Claims 1 to 4, which has a heat resistance temperature of 1,200°C or more.
6. A porous material according to any of Claims 1 to 5, which has a gas permeability coefficient of 1  $\mu\text{m}^2$  or more.
7. A method for producing a porous material set forth in 30 any of Claims 1 to 6, wherein the method comprises the steps

of:

mixing at least silica, silicon nitride and a pore former;

firing the resulting mixture at 1,400 to 1,500°C in an  
5 inert gas atmosphere or reduced-pressure atmosphere where the oxygen partial pressure is 10 Pa or less to prepare a silicon-silicon carbide porous material; and

nitriding and firing the silicon-silicon carbide porous material at 1,200 to 1,800°C in a nitrogen atmosphere.

10 8. A method for producing a porous material according to Claim 7, wherein, after preparing the silicon-silicon carbide porous material, the atmosphere used therein is changed to a nitrogen atmosphere without lowering the temperature to room temperature and keeping the temperature at 1,200°C or more,  
15 and nitriding and firing the silicon nitride-silicon carbide porous material at 1,200 to 1,800°C in the nitrogen atmosphere is conducted.

9. A method for producing a porous material according to Claim 7, wherein, after preparing the silicon-silicon carbide porous material, nitriding and firing the silicon-silicon carbide porous material at 1,200 to 1,800°C is conducted in a nitrogen atmosphere containing 0.1% by volume or more of hydrogen.

10. A method for producing a porous material according to  
25 Claim 7, wherein, after the preparation of the silicon-silicon carbide porous material, the atmosphere is changed to a nitrogen atmosphere containing 0.1% by volume or more of hydrogen (a hydrogen-containing nitrogen atmosphere) without lowering the temperature to room temperature and keeping the  
30 temperature at 1,200°C or more, and nitriding and firing the

silicon-silicon carbide porous material at 1,200 to 1,800°C in the hydrogen-containing nitrogen atmosphere is conducted.

11. A honeycomb structure constituted by a porous material set forth in any of Claims 1 to 6.